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CHARLES ELMORE CROP

Supreme Court of the United States

OCTOBER TERM, 1929.

No. 71.

MINERALS SEPARATION NORTH AMERICAN CORPORATION,
Petitioner,
—vs.—
MAGMA COPPER COMPANY,
Respondent.

PETITION FOR REHEARING.

TO THE HONORABLE THE CHIEF JUSTICE AND THE ASSOCIATED JUSTICES OF THE SUPREME COURT OF THE UNITED STATES.

Your petitioner, Minerals Separation North American Corporation, respectfully represents as follows:

I. That the decision of this Court filed February 24, 1930, overlooks two principles of law established by many adjudications of this Court, namely

(1) That an improvement of an art or process may be patentable as well as the art or process itself, and

(2) That to anticipate a patent a prior patent must describe the invention in suit in such full, clear and exact terms as to enable anyone skilled in the art to practice it without the exercise of invention.

II. That facts recited in the opinion as leading to the conclusion of anticipation reached are contrary to the evidence.

I.

The Errors of Law.

1. U. S., R. S. 4886, includes as patentable not only "any new and useful art" but also "any new and useful improvements thereof."

Eibel Process Co. v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 63.

This Court in finding anticipation of the patent in suit by the disclosures of patent No. 835120, holds that the disclosure of 835120 is a general one having to do with reduction in the quantity of the agent used and is not limited to the use of any particular agent or class of agents.

Even so, there is no disclosure in that patent of the use of a mineral-frothing agent in solution or of the different mode of operation, the superior advantages and the different results of such an agent in ore concentration.

The patentees of the patent in suit 962678 were the first ever to use a mineral-frothing agent in solution (to wit, in December, 1908) and they discovered that such an agent had a superior advantage over oleic acid, the insoluble exemplar disclosed in 835120, and which had been alone theretofore used in commercial operations of froth flotation.

They discovered that it produced a froth superior to the froth produced in that example and produced that froth by an operation different from the coating operation described in connection with that example in 835120, and it turned out eventually that such a mineral-frothing agent in solution successfully concentrated an important class of ores (porphyry copper ores) which could not then and cannot now be successfully concentrated by oleic acid or by any other insoluble agent.

(a) That the froth produced by a mineral-frothing agent in solution is distinguishably different from the froth produced in the example given in 835120 is testified to by petitioner's

expert and is not denied by respondent's (R. Vol. I, p. 401, Qs. 43, 44; main Brief for Petitioner, pp. 31, 32).

The fact that mineral-frothing agents in solution modify the water so that great quantities of very small bubbles are formed may be observed by the Court by vigorously shaking the bottles, Plaintiff's Exhibits 27-31, inclusive, which were filed at the argument (if there is air in the bottle), in contrast with a bottle of plain water which was included with them for the purpose.

(b) That the mode of operation (in forming the froth) described in 835120 in connection with the example there given is different from the mode of operation in forming the froth in the improved process with a mineral-frothing agent in solution, appears from the fact that in the one case (835120) the metalliferous mineral particles are coated by the agent used whereas in the other case (962678) they are not, and by the further fact that in the one case (835120) the air bubbles that form in the unmodified water attach themselves only to coated metalliferous mineral particles whereas in the other case (962678) the air bubbles that form in the modified water attach themselves to uncoated metalliferous mineral particles.

The action of the agent in relation to the metalliferous mineral particles is different in the two cases, and the action of the air bubbles in relation to the metalliferous mineral particles is different in the two cases.

(c) Both of these propositions of difference, to wit in the froth, and in the way in which the froth is formed, are shown to be significant and substantial by the difference in the practical usefulness of the two processes.

The improved process using a mineral-frothing agent in solution is so different that the porphyry copper ores, the world's present greatest source of copper, are amenable to it, whereas they have not been, and are not, amenable to the first froth-flotation process as exemplified in 835120 (see main Brief for Petitioner, pp. 46-52).

Here, we respectfully submit, are all the elements of a patentable "improvement" over and above the discovery disclosed in 835120 as that discovery is defined in the opinion of this Court in the instant case (page 3, second paragraph, lines 1-4):

> "that a very minute portion of the oil worked in an unexpectedly different way from that familiar with larger quantities—not in the matter of coating the particles, but in helping to produce a froth that floated instead of granules that sank * * *."

The discovery disclosed in 962678 added to this the further conception that with a mineral-frothing agent in solution the mineral-bearing froth that floated would be different and better for ore concentration purposes and would be applicable to a wider range of ores and to more difficult ores and particularly to porphyry copper ores.

2. That a prior patent to anticipate must certainly and without any doubt or peradventure describe in its entirety the discovery and improvement of the patent in suit is established law in this Court.

In *Seymour* v. *Osborne*, 78 U. S., 516, 555, Mr. Justice Clifford said:

> "Mere vague and general representations will not support such a defense, as the knowledge supposed to be derived from the publication must be *sufficient to enable those skilled in the art or science to understand the nature and operation of the invention*, and to carry it into practical use." (Italics ours.)

In *Cohn* v. *Corset*, 93 U. S. 366, 370, Mr. Justice Strong said:

> "It must be admitted that, unless the earlier printed and published description does exhibit the later patented invention in such a full and intelligible manner as to enable persons skilled in the art to which the invention is related to comprehend it without assistance from the patent, or to make it, or repeat the process claimed, it is insufficient to invalidate the patent."

This rule was affirmed in *Downton* v. *Yeager Milling Co.*, 108 U. S. 466, 471, and in *Eames* v. *Andrews*, 122 U. S. 66. See also *Railroad Co.* v. *Turrill*, 94 U. S. 695, 704.

In *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U. S. 403, 420, Mr. Justice Brown said of a prior patent:

> *"It is sufficient to say of it that it fails to disclose, fully and precisely, the essential features of the process covered by the Jones patent."* (Italics ours.)

We believe and submit that in the case at bar this Court has found anticipation where the certainty required does not exist. But this proposition will become more manifest when we have dealt with the errors of facts in the opinion.

II.

The Errors of Fact in the Opinion.

I. The opinion says of the disclosure of 835120 (p. 3, lines 8 and 9 from the bottom):

> "No particular oil was mentioned * * *."

This was of course an oversight because the patent (835120) gives a specific example and explicitly names a particular agent. The patent says (R. Vol. II, p. 1004, lines 70-72):

> "The following is an example of the application of this invention to the concentration of a particular ore."

The particular ore is a lead-zinc ore. The particular oil or oily substance mentioned is oleic acid, a fatty acid which is an oily liquid (R., Vol. II, p. 1004; patent, p. 1, line 80).

The description of the example extends to page 2 of the patent, line 8 (R., Vol. II, p. 1005), and that example is specifically claimed in claims 5, 6 and 7 (R., Vol. II, p. 1006, lines 83-112).

Whether the disclosure of 835120 includes anything other than oleic acid is a matter of inference from other language to be later considered.

The practical importance of the particular oil mentioned by way of example is that the discovery of 835120 was made while using that particular oil in the Cattermole metal-sinking process as related in the decision of this Court in the *Hyde* case (242 U. S. 261, 266, 267). The importance of the matter is shown also by the fact that all commercial froth-flotation operations in the world up to about July, 1912, were conducted with that particular oil (main Brief for Petitioner, p. 46).

2. The opinion of this Court in the instant case says (p. 3, lines 14 and 15):

> "It is a matter of reasoning rather than of observation that the oil coats the mineral particles."

This was an error of fact.

There is no doubt but that the writer of both specification and claims of 835120 believed that the oleic acid, or other oily substance used, actually coated the mineral particles and not the gangue particles. This appears in the statement of the discovery (patent, p. 1, line 33; R., p. 1004)[1]; in the statement of the operation (p. 1, line 96, R., p. 1004)[2]; in the statement of the result (p. 2, line 4, R., p. 1005)[3]; in all the claims (p. 3, lines 46, 57, 67, 78, 89, 99, 110, 121, 129, R. 1006, and p. 4, lines 5, 11, 19, 23, 41, R., p. 1007), and in numerous other places.[4]

In the Appendix we analyze the art prior to 835120 in this regard and demonstrate the universal belief and acceptance of the fact, that an oil, or oily substance, like oleic acid, actually coats the mineral particles. We ask the Court to read the

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[1] "oil-coated metalliferous matter"

[2] "such bubbles or air-films adhering only to the mineral particles which are coated with oleic acid"

[3] "oil-coated metalliferous matter"

[4] The patent refers to the oleic acid "forming the coating on the metalliferous matter which produces the froth" (p. 2, lines 13-16). It describes a method for the recovery of "sunk oiled metalliferous matter" (p. 2, line 104). It refers to "a thin coating of oil on these mineral particles for which oil has an affinity" (p. 2, lines 128, 129). It refers to the act of coating as "oiling" (p. 1, line 37), and refers to the oil-coated minerals as the "oiled mineral." It speaks of the use of acid "to prevent gangue from being coated with oily substance" (p. 1, lines 41, 42).

Appendix at this point. It is, we believe, conclusive of the matter.

It was this prior art that this Court in the *Hyde* case summed up when it said (242 U. S. 261, 266):

> "It is clear that in the prior art, as it is developed in this record, it was well known that oil and oily substances had a selective affinity or attraction for, *and would unite mechanically with*, the minute particles of metal and metallic compounds found in crushed or powdered ores, but would not so unite with the quartz, or rocky non-metallic material, called 'gangue.' Haynes British patent (1860), and the United States patents, Everson (1885), Robson (1897) and Elmore (1901)." (Italics ours.)

The fact that the oleic acid does not dissolve in the water of the ore pulp but remains in undissolved globules therein until it coats the mineral, is not seriously denied by Respondent's experts. One of them admitted that the solubility of ordinary glass "is of the same order of magnitude as the oleic acid" as used in the process (R., Vol. I, p. 371, RXQ. 143), and the other asserted that "glass certainly would not be considered soluble for the purposes of flotation" (R., Vol. I, p. 211, Q. 38).

Petitioner's proofs demonstrated the fact that oleic acid coats the metalliferous mineral particles, and did so not by reasoning but by observation and by experiments and demonstrations, chemical and physical, more conclusive than observation (main Brief for Petitioner, 53-55).

That the metalliferous mineral particles in the froth are actually coated with oleic acid is further demonstrated by the fact of the possibility of removing the coating of oleic acid from those particles by the use of a dilute solution of caustic alkali. This is described in the specification of patent 835120 (p. 2, lines 3-8; R., Vol. II, p. 1004) and in claim 4 (p. 3, line 81), claim 8 (p. 3, line 125) and claim 13 (p. 4, line 41); also using the oleic acid in the process in the form of soap in which it is recovered from the metalliferous mineral particles (p. 2, lines 9-13).

3. But the most important and most fundamental error of fact in the opinion is with reference to the meaning of the phrase of patent 835120 (p. 1, lines 13-15; R., 1004):

> "or other substances which have a preferential affinity for metalliferous matter over gangue."

This is the phrase which in the view of the Court gives 835120 its anticipating breadth of disclosure.

Of it the Court said in its opinion (p. 2, three lines from the bottom):

> "The nature of the affinity is not specified and it cannot be confined to the kind of action shown by oil."

This matter is of crucial importance because clearly the

> "simple preliminary test * * * to determine which oily substance yields the proportion of froth or scum desired,"

referred to in 835120 (p. 1, lines 61-69) is, and must be, in the view of all, limited to

> "substances which have a preferential affinity for metalliferous matter over gangue."

The broadest scope of the disclosure of 835120 clearly cannot go beyond the meaning of that phrase.

The Court is in error as to that meaning.

835120 does not, it is true, specify the nature of the affinity in question but assumes that its nature is known to persons skilled in the art.

That the nature of that affinity, as so understood in the art, was and must be confined to the kind of action shown by an undissolved substance in an ore pulp, is, we submit, demonstrated by the analysis and quotations from the prior art found in the Appendix, to which we again refer the Court. We also refer to main Brief for Petitioner, pages 76-80, and Reply Brief for Petitioner, pages 1-11.

Although the preferential affinity referred to has been described as a "mysterious affinity"* the mystery is only as to the reason why the affinity exists. There is no mystery as to the manner in which it acts. Given an ore pulp in a state of agitation, the particles of metalliferous matter and particles of gangue moving about in the agitated mixture, and given the presence, disseminated by the agitation through that disturbed mixture, of undissolved particles or fine globules of a substance having this affinity, contact between those globules and the metalliferous mineral particles results in its uniting mechanically with the metalliferous particles and coating them, and contact between those globules and the gangue particles does not result in either union or coating. This is the preferential affinity referred to in 835120. It requires contacts and mechanical union and these presuppose the insolubility that is essential to its action. It produces coated particles of metalliferous minerals. It is not peculiar to froth flotation. It must be present in metal-sinking processes as well. Froth flotation is not evidence necessarily of its presence.

In the process of 835120 the coating of the mineral particles by the preferential action (resulting from preferential affinity) of the oil or oily substance, prepares them for selection by, and adherence to, the air bubbles in the agitated pulp, "such bubbles or air-films," as the patent says (p. 1, line 94; R., p. 1004), "adhering only to the mineral particles which are coated with oleic acid." The preferential action of the oily substance on metalliferous matter over gangue prepares that metalliferous matter for this subsequent preferential action of the bubbles or air films on the coated particles. Here are two preferential actions, quite different the one from the other, the one exercised by the oil for the metalliferous mineral particles (not new with 835120), the other exercised by the air bubbles for such particles when coated (new with 835120), and both essential to the mineral-froth-forming results. But this Court has failed to observe, or has entirely lost sight of, this distinction. The

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* Lord Atkinson in *Minerals Separation* v. *British Ore Syndicate Limited*, 27 RPC, 33, 49, quoted in *Minerals Separation* v. *Hyde*, 242 U. S. 269.

description, however, and the claims of 835120 clearly make the distinction.

Thus claim 12, for example (patent, p. 4, line 17; R., p. 1007), is for a process consisting of three steps, namely, first, coating the mineral with oil in the water, etc., secondly, agitating the mixture to cause the oil-coated mineral to form a froth, and thirdly, separating the froth.

That the prior art (conveniently epitomized in that regard in the Appendix) universally employed and accepted the phrase in question as "confined to the kind of action shown by oil," we submit with confidence, and that prior art is illuminative of the disclosure of 835120 and of the limitations of that disclosure. The preferential affinity of oil and oily substances, whereby they coat the metalliferous mineral particles and not the gangue, was not the discovery of 835120, as this Court said in the *Hyde* case (242 U. S. 261, 264), and as the opinion in this case reiterates (p. 3), but the preferential affinity of bubbles or air films in agitated pulp for the previously coated mineral particles was the discovery of 835120, when and if the oil coating were made very minutely thin, or, as Lord Atkinson phrased it in the House of Lords (242 U. S. 261, 269), when

> "the metallic particles are only coated with a thin film of it."

The discovery of 835120 was predicated on the exceeding thinness of the oil film on the metalliferous mineral particles and the resulting preferential affinity that the bubbles or air films would have for the so thinly coated metalliferous mineral particles over the water-wetted gangue, as contrasted with coatings on the metalliferous mineral particles so thick and therefore so sticky that the particles would adhere together and form granules which sank; and the disclosure of 835120 is limited in that regard to substances which have a preferential affinity for metalliferous matter over gangue and in consequence coat that metalliferous matter even though that coating be exceedingly thin.

The patentees of 962678 discovered that it was not necessary to froth flotation to use a substance which had a preferen-

tial affinity for metalliferous matter over gangue. They discovered that a substance which modified the water by going into solution in it, and so modified the bubbles or air films formed in that water, would cause those modified bubbles or air films to have a preferential affinity for entirely uncoated metalliferous matter over uncoated gangue. This was an additional discovery, a different discovery, and it enabled the operator to form a mineral-bearing froth without the use of an oil or oily substance or any substance having a preferential affinity for metalliferous matter over gangue. On the contrary it relied entirely on the preferential affinity of modified air bubbles for metalliferous matter over gangue.

4. The opinion herein says (page 3, lines 18, 20):

> "But we agree with the defendant's argument * * * that No. 835120 was not describing the work of insolubles alone."

This, we believe and submit, was an error of fact.

835120 was alone describing the work of substances which were capable of *very thinly coating* the mineral particles in preference to the gangue and which thereby invoked the power of air bubbles to attach themselves to such very thinly coated particles in preference to particles wetted by the water.

This power or preference of air bubbles is prefigured in patent No. 793808 to Sulman & Picard, where it is said (R., Vol. II, p. 991, lines 16-19):

> "we utilize the power which is possessed by films or bubbles of air or other gas of attaching themselves to solid particles moistened by oil or the like."

and again (lines 65-70):

> "The oiled metalliferous particles * * * have the power of attaching to themselves with a greater comparative strength than the gangue particles the films or bubbles of gas which exist in the mass * * *."

The very thin coating of 835120, however, was not here disclosed, as this Court in substance held in the *Hyde* case and the *Butte* case.

The power of air bubbles to attach to themselves very thinly coated particles in preference to uncoated particles is disclosed in 835120 (R., p. 1004; p. 1, lines 28-35), and is described at line 94:

> "such bubbles or air-films adhering *only* to the mineral particles which are *coated* with oleic acid." (Italics ours.)

We believe that the prior art as epitomized in the Appendix and summed up by this Court in its opinion in the *Hyde* case, 242 U. S. 261, 264, heretofore quoted, and the definition of the discovery of 835120 given in the opinion herein at page 3, also heretofore quoted, demonstrate the error of the Court in extending the disclosure of 835120 to the work of substances that do not, and cannot, preferentially coat the mineral particles.

5. The opinion of this Court also says (p. 3, lines 14-16)

> "The experts differ whether the same thing does not take place when a soluble substance is used."

We respectfully submit that the record shows a failure of proof in this regard on the part of Respondent, with the burden of proof, as it must be, on Respondent, for it is attacking the validity of a patent by the alleged disclosures of a prior patent.

In behalf of Respondent a theory was put forward as to the action of mineral-frothing agents in solution to the effect that they also coated the solid particles in the pulp. The theory was based upon the molecular phenomenon of adsorption which is not preferential. This theory was not supported by facts and was proved to be irreconcilable with the proved and undisputed facts. It is fully considered in the main Brief for Petitioner at pages 64-70. It is fundamental in scientific work that a theory which is not in accord with the facts must be discarded.

6. The opinion herein says (p. 3, lines 16-18):

> "But we agree with the defendant's argument that no one concerned in this business would care a straw as to the intimate nature of the action if it produced the result, * * *."

In this, we believe and submit, the Court was misled by the argument that the mill man would not care how an operation was conducted if in fact the metalliferous matter really rose in any kind of a froth that could be separated.

This art is peculiar in the respect that every mill has and must have its metallurgical laboratory. No ore concentrating mill ever was constructed, or could be run a single day, except by the painstaking planning, and under the daily supervision, of a highly skilled metallurgist. These metallurgists are technically educated men and they must always first elaborately test and experiment in the laboratory with the ore that the mill is to handle and determine its characteristics and the problems of its grinding and the best concentration processes to be applied to it in its different stages, and in the matter of flotation to determine the best agent or agents to be used and the best conditions, such as temperature, acid, alkaline or neutral water of the pulp, gangue correctives, etc.; and when such an ore-concentrating mill is once successfully operating, the metallurgist in charge would not dare introduce the slightest variation in the procedure until after demonstration of its usefulness by carefully conducted tests in the laboratory and probably also in small scale operations. The risk of wasting valuable metal is too great. These metallurgists are the men skilled in the art to whom the patents of the art are addressed. Those patents are not addressed to the mill men who turn valves on and off, collect samples for assay in the laboratory and do as they are told; who watch against stoppages and overflows and other changes that they learn to detect by the eye. These are mere laborers although designated mill men. Such mill men, as well as the owners of the mills who enjoy the profits of the operations, are generally neither chemists nor metallurgists and they would not understand the meaning of the technical terms used in ore concentration patents, or the difference between a soluble and an insoluble agent, and such mill men and such owners would not care a straw as to the intimate nature of the action.

But the metallurgists in charge would understand such technical terms in the art and such differences and would know

what oleic acid is (the example given in 835120) and what are the substances having a preferential affinity for metalliferous matter over gangue referred to there. Such a metallurgist would know that oleic acid, or other oily substance so defined, would coat the metalliferous particles in preference to the gangue, and would know that in the small quantity prescribed that coating would be very thin and would know that the preferential action of such oleic acid or other oily substance would be enhanced in the case of an acidified pulp and would be further enhanced in the case of a slightly heated pulp. Such a metallurgist would know also what the different substances and classes of substances recited as agents in the patent in suit are, and would know that those agents would dissolve in the water of the pulp and could not coat the mineral particles preferentially or otherwise, thickly or thinly, and would see and know that the froth produced in the case of the patent in suit was different from the froth produced in the case of the oleic acid or other oily substance process of 835120.

The fact is proved in the record, as heretofore stated that, from March, 1905 (when the discovery of 835120 was made), until long after December, 1908 (when the discovery of 962678 was made), all commercial operations of the process of 835120 were carried on with oleic acid as the mineral-frothing agent and a zinc-lead ore as the ore to be concentrated, this applying to Australia and all other parts of the world until July, 1912, in Sweden (main Brief for Petitioner, pp. 46-52).

There was not a word of evidence of any other use of the process of 835120 in ore concentration mills during the period from March, 1905, to December, 1908, and the only evidence of any laboratory uses or investigations were those undertaken in connection with the discovery and invention of the process of 835120, to wit, Higgins' report of March 16, 1905, wherein the surprising results of the use of minute quantities of oleic acid were reported, and it was also reported that crude petroleum, paraffine (kerosene oil) and melted tallow were useless for the purpose (R., Vol. II, pp. 1192-1196), and the report of Sulman and Picard dated May 3, 1905, wherein the action of small quantities of oleic acid was confirmed (R., Vol. II, pp.

1196-1200), and it was stated that petroleum residuum and paraffine oil (kerosene oil) and admixtures thereof (all of them insoluble oils) had been used in the laboratory and gave small proportions of froth and were not as efficient as oleic acid (R., pp. 1200-1201).

7. The opinion herein says, referring to patent 835120 (p. 3, last 8 lines):

> "The public was directed to make a 'simple preliminary test to determine which oily substance yields the proportion of froth or scum desired.' The patent having been held good as to the oils although experiment was necessary to find out what oil would work best with a given ore the disclosure was an anticipation although experiment might be necessary to choose among the substances having the required affinity the one that would produce the best result."

The principal error here is in the misunderstanding of the meaning and effect, as applied to the facts of the present case, of the direction in 835120 to make preliminary tests in the application of the disclosed process to different ores. Additionally there is again the error above pointed out as to the meaning of the descriptive phrase in 835120, "substances having a preferential affinity for metalliferous matter over gangue."

The language of 835120 is as follows (R., Vol. II, p. 1004; p. 1, lines 61-69):

> "The proportion of mineral which floats in the form of froth varies considerably with different ores and with different *oily substances,* and before utilizing the facts above mentioned in the concentration of any particular ore a simple preliminary test is necessary to determine which *oily substance* yields the proportion of froth or scum desired." (Italics ours.)

It is to be noted that this direction is closely limited to oily substances. Further it is part of a specification the broadest disclosure of which is "substances which have a preferential affinity for metalliferous matter over gangue." The meaning of that description and its limitation to insoluble substances

has been heretofore fully considered. The reason for the insertion of this direction is well stated in the decision of this Court in *Minerals Separation, Ltd. vs. Hyde*, 242 U. S. at 270, 271, as quoted in the language in the Brief for Petitioner-Plaintiff at page 35. As this Court then said:

> "The composition of ores varies infinitely, each one presenting a special problem, and it is obviously impossible to specify in a patent the precise treatment which would be most successful and economical in each case."

The skilled metallurgist when asked to decide whether a process may be successfully used with an ore with which it has not theretofore been used, makes "a simple preliminary test," and usually many of them, to determine whether or not the process and the agent under consideration are applicable to this ore, and in what proportions and under what conditions the ore is most successfully concentrated by the process. This is done in the metallurgical laboratory, and the results obtained check and guide and determine the subsequent operations in the mill. It is submitted that the direction in patent No. 835120 was not a general direction to run the gamut of all known substances, but to test first oleic acid and then possibly other substances like it, "oily substances," which would function in the same way in the water of the pulp. It was a direction to test different oily substances in applying the disclosed process to different ores. As this Court further said in *Minerals Separation, Ltd.* v. *Hyde*, and as is also quoted at page 35 in the Brief for Petitioner-Plaintiff:

> "The process is one for dealing with a large class of substances and the range of treatment *within the terms of the claims*, while leaving something to the skill of persons applying the invention, is clearly sufficiently definite to guide those skilled in the art to its successful application, as the evidence abundantly shows." (Italics ours.)

The disclosure in question did not result in anything more, industrially, than the application of the process of patent No. 835120, with oleic acid as the mineral-frothing agent, to the

treatment at several mills in Australia of several zinc-lead ores; and until the knowledge of the invention of the patent here in suit was available, no further progress was made. When the knowledge of the invention of the patent in suit was available, the new process which it disclosed vastly widened the field; but the process of the patent in suit is not the only patented process that has contributed to the tremendous advance that has been made in the art of froth-flotation ore concentration. There have been many such patented improvements in froth flotation processes made since the date of the patent in suit, mostly relating to the agents used, and each improvement that was not obvious from the disclosures that preceded it is surely entitled to the reward of a patent.

The direction in patent 835120 to make a test was simply and only a direction to test the process disclosed in the patent. It is a characteristic of processes in this art that the proportions used are varied in the applications of the processes to different ores. For example, in the Cattermole patent No. 777273, which discloses the invention which was under investigation when the process of patent No. 835120 was discovered and invented, there are similar directions, for the determination, necessarily by test, of that most essential element, the proportion of oily material used, the later substantial reduction of which brought about the discovery of the process of 835120. For example, it is said (R., Vol. II, p. 970, lines 32, 36):

> "if the proportion of oil is kept within reasonably low limits (differing in different cases, according to the nature of the mineral to be treated and the consistency and nature of the oil) * * *"

and again (p. 971, lines 63-66):

> "The proportion of oil used depends upon its viscosity, the fineness of the ore, and other factors, and the consistency and size of the mineral granules desired."

This direction to vary the proportion of oil in the use of different oils and in the application of the process to different ores was held by this Court in *Minerals Separation, Ltd.* v. *Hyde* not to anticipate the discovery of the froth-flotation proc-

ess of patent No. 835120, by a reduction of the amount of oil used in the Cattermole process, without other change in the procedure.

As we have said the work of a testing laboratory is a necessary part of the work of introducing any and every process of ore concentration to use in the treatment of the vast variety of different ores, and froth-flotation processes peculiarly require this work to be done. They are physical processes adapted to deal with a great variety of ores. When the process is known, the variations within that process may be tested and the application of the process to any particular ore must be tested in every case before the process is put into use in the mills. The expenditure of great sums of money in mill construction are based upon this testing work, usually followed by small scale operations, and the final adoption of the process in the treatment of thousands of tons of ore per day only occurs after all this preliminary work has demonstrated the usability of the process.

The disclosure of patent 835120 was that oleic acid, when used in an amount which was a fraction of one per cent. on the ore and in a heated pulp and in the presence of sulphuric acid and subjected to vigorous agitation and aeration, would coat the metalliferous mineral particles and that the coated metalliferous mineral particles would unite with air bubbles and form a mineral-bearing froth. In conformity with the facts of the metallurgical art, this being a physical process which might be found to be applicable to a great variety of ores, and it being the fact that "with different ores and with different oily substances" "the proportion of mineral which floats in the form of a froth varies considerably," it was directed that in determining the applicability of the process to "any particular ore a simple preliminary test" should be made "to determine which oily substance" yielded successful results. The direction for preliminary tests was limited to "oily substances" and the broadest suggestion of the patent was "oils, fatty acids, or other substances which have a preferential affinity for metalliferous matter over gangue." Oleic acid is

a fatty acid and an "oily substance" and in an ore pulp exercises such preferential affinity and preferentially coats the metalliferous mineral particles. The entire art prior to the invention of the process in suit had been concerned only with substances functioning by reason of their "preferential affinity for metalliferous matter over gangue" in the mixture of ground ore and water known as an ore pulp, and preferentially coating the metalliferous mineral particles. The exercise of that preferential affinity required insolubility of the substance in the water of the ore pulp.

With this disclosure and knowledge, the patentees of the patent in suit discarded oils, fatty acids and other substances which have a preferential affinity for metalliferous matter over gangue. They conceived the idea that substances which were incapable of exercising this preferential affinity, might be wholly dissolved in an ore pulp, and the ore pulp then agitated and aerated, and that this might in some manner produce a mineral-bearing froth. They tested it carefully and thoroughly over a period of months and found that by a different mode of operation they had produced a different kind of mineral-bearing froth. This, it is submitted, was a patentable invention, and it is the invention which is disclosed and claimed in the patent in suit.

General Considerations.

The following facts of record, taken from the pages of history of a time for the most part long antedating this controversy, and having to do directly with the question whether the process of the patent in suit is disclosed in No. 835120, raise an unusually strong presumption on that question of technical fact, and may have been overlooked by this Court or not given proper consideration and weight, namely:

1. Prior to the issue of the patent in suit, No. 962678, no one anywhere in mill or laboratory had ever attempted to concentrate ores by mineral-froth-flotation by the use of a substance in solution. This was in spite of the worldwide patenting and publication of the 835120 process and its successful use on the zinc dumps and ores at Broken Hill, Australia, and

in spite of the resulting Elmore infringement litigation in England and Australia which threatened the 835120 process with injunction because it employed oil and acid in a flowing pulp, which was what Elmore claimed.

2. From December 8, 1908, when the discovery was made that mineral-froth flotation could be successfully achieved by the use of one particular substance in solution and on through continuous experiments thereafter with other substances in solution, all the experts involved in those experiments (and they were all of them familiar with the process of 835120 and none in the world knew that process better than they) regarded the process employing mineral-frothing agents in solution as novel, and as invention, and as invention of a high order. This is evidenced by the immediate steps that were taken to patent the process in England and in this country. This consideration is adverted to by this Court in the *Hyde* case as "persuasive evidence," along with extensive use, "of that invention which it is the purpose of the patent laws to reward and protect" (242 U. S. 261, 270).

3. The technical men in the Patent Office, skilled in this art, who were called upon by the application for the patent in suit to pass judgment on the question whether the process had been disclosed in 835120, found that it had not been there disclosed. The presumption of validity arising from a fact of this character on a technical issue of this kind has often been emphasized by this Court.

4. The actual benefit to society wrought by the discovery and process of the patent in suit has been so stupendous as to entitle the patent to liberal treatment in order to preserve rather than to destroy it, as this Court has frequently said.

5. The entire art with the exception of the respondent and one other concern has acknowledged and acquiesced in the validity of the patent in suit and has paid large royalties for the use of the process. This is evidenced by the great number of licenses taken out all of which continued after the expiration of 835120 and to the date of expiration of the patent in suit,

over three and one-third years later, and by the payment of substantial royalties during that more than three and one-half years by those licensees, amounting in rate to about one-half of what had been paid for a license under both patents prior to the expiration of 835120. This evidences in the strongest possible way the practical judgment of the experts of the art that the patent in suit is not anticipated by 835120.

6. Certainly five and apparently six of the eight Judges who have heretofore had to pass upon the precise question of anticipation of the patent in suit by 835120 have decided that it is not anticipated, namely, in the *Miami* case, Judge Bradford (237 Fed. 609), Judges Buffington, McPherson and Woolley (244 Fed. 752), and in the instant case Judge Peters (23 Fed. (2d) 731) and apparently Judge Anderson (30 Fed. (2d) 67, 73).

WHEREFORE your petitioner respectfully requests that a rehearing may be granted and that the mandate of this Court may be stayed pending the disposition of this petition.

Very respectfully,

MINERALS SEPARATION NORTH AMERICAN CORPORATION

By HENRY D. WILLIAMS,
of Counsel.

HENRY D. WILLIAMS,
WM. HOUSTON KENYON,
LINDLEY M. GARRISON,
FREDERIC D. MCKENNEY,
SIDNEY ST. F. THAXTER,
of Counsel.

Dated, New York, N. Y., March 18, 1930.

We hereby certify that the above petition for rehearing is well founded in law and is presented in good faith and not for delay.

HENRY D. WILLIAMS.
WM. HOUSTON KENYON.
FREDERIC D. McKENNEY.

APPENDIX.

(Italics ours.)

Haynes, 1860 (R., Vol. II, pp. 923-927).

Improvements in obtaining metals from ores.

Adds to powdered ore (R., Vol. II, p. 925, lines 7-11)

> "what I term my 'agent,' which is composed of certain substances *not soluble in water alone,* that is, bituminous matter (coal tar from gas works, and such like, for instance), gums or gummy matter (amongst others, gutta percha, india-rubber, for instance), and fatty or oleaginous matter, and having mixed these together * * *."

(lines 19, 20):

> "when the earthy or foreign matter has separated from the agent and metal, *which alone remain in union,* I remove, * * *."

(p. 926, lines 29-32):

> "the agitation being still kept up, the agent acts upon the metal, and gradually effects the separation of the metal from the earthy or non-metallic matters of the ore or matrix, or ore and matrix, the earthy matter sinking to the bottom of the water, and the metal being retained by the agent."

(line 35):

> "To remove the agent from the metal, I put the agent and metal still in union in a vessel containing an alkaline solution, * * *."

Bessel, 1877—First Patent (R., Vol. II, pp. 929, 930).

(p. 929):

> "The crude impure graphite is mixed with a small quantity (1% to 10%) of an organic substance, which, if liquid, is *not miscible with water or is only slightly miscible,* and which, if solid, is not dissolved or wetted by water."

Then follows a list of twenty substances or classes of substances and it is said (p. 930):

> "The mixture of the graphite with the substance chosen is intimately made so that all parts of the former shall come into contact with said substances."

Bessel, 1886—Second Patent (R., Vol. II, pp. 932-934).

The substances mentioned in the first patent are referred to but especially bitumens particularly including (p. 934)

> "crude and refined petroleum, the by-products of the refining process, paraffine, benzine, mineral oil, mineral tar, ozokerite."

The claim recites purification of graphites by the production of an intimate mixture of the graphites

> "with organic substances *not soluble in water,* especially hydrocarbons in solid and liquid state, fusel oils, etc., * * *."

Everson, 1886 (R., Vol. II, pp. 935-937).

(p. 935, lines 9-14):

> "The discovery which forms the basis of my invention is that metals and metallic substances in a comminuted state *will unite with* compounds of fats or oils and acids, and that such compounds *will not unite with* comminuted quartz or other rocky gangue."

Everson then describes the mingling of ore and water (lines 22-25)

> "for the purpose of effecting *a union* of the free metal or metallic portion of the ore with such admixed material, * * *."

The rocky gangue is then said (line 71)

"to be removed by a washing process".

The claims recite mixing with the ore (p. 937, lines 70, 77)

"a fat or an oil or a constituent thereof".

Robson and Crowder, British, 1894 (R., Vol. II, pp. 940-943).

Describes a mixture of turpentine, petroleum, etc., and a fatty oil which is described (p. 940, lines 29, 30) as

> "capable of *taking up* the said finely divided metallic matter and thus separating it from the substances with which it was previously mixed."

This is spoken of (line 40) as

"a selective action".

Robson, 1897 (R., Vol. II, pp. 947-951).

Speaks of (p. 949, lines 35-40)

> "an oily liquid that is of less specific gravity than water, and is capable of *taking up* the said finely-divided metallic matter and thus separating it from the substances with which it was previously mixed."

The claims (p. 951) refer to the agent (line 27) as

"a fatty substance"

(lines 37, 38):

"a fatty oil"

(lines 62, 63, 69):

"an oily liquid."

Elmore, 703,905, 1902 (R., Vol. II, pp. 952-954).

Is for an oiled belt separator.

Title: Separation (p. 953, lines 7, 8)

"by the selective action of oils and like substances".

So the claims (p. 954, lines 23, 40, 48).

The invention is said to relate to separation (line 11)

"by the selective action of oils and like substances".

Definition (lines 17-20):

"In what follows I shall use the word 'oil' to mean either oil or any other substance that can exert a selective action on minerals *such as oil exerts.*"

Operation (lines 33-40):

"The oil by its selective action *coats or absorbs* the metallic particles, sulfids, tellurids, and the like. * * * the oil *attaches itself to or coats* such particles, while it does not coat or attach itself to the rocky or earthy particles present."

(line 96):

"I find that the action of the oil in selecting some kinds of mineral from other kinds is greatly increased by adding to the pulp a small quantity of acid, such as sulfuric acid or such acid substances as the cuprous liquors from mine-water."

Cattermole, British, 1902 (R., Vol. II, pp. 962-964).

Granulation process.

Relates to separation (p. 963, line 31)

"by means of the selective action of oils on minerals."

Operation:

Granulation (lines 45-47)

> **"agglomerated or granulated by the oil which *adheres in the form of a thin film* to the metalliferous constituents, which tend to sink."**

Specifies what oils may be used (p. 964, lines 5-9):

> **"Any animal, vegetable or mineral oil may be used, which alone or in conjunction with an emulsifying agent has the property of *picking up* metalliferous mineral particles; for example linseed oil, lard, paraffin or light hydro-carbon oil, heavy hydro-carbon oils, preferably mixed with a fatty acid or fatty oil, also act well."**
>
> **(line 19):**
>
> **"In order *to recover the oil from the granules,* they are subjected to the action of emulsifying agents * * *."**

Cattermole, 763260, 1904 (R., Vol. II, pp. 969-972).

A granulation process.

> **(p. 970, lines 20-28):**
>
> **"when a mixture of powdered metalliferous matter and gangue is treated with oil suspended in water—that is to say, in emulsion—the oil has a more or less selective action *and will coat the particles* of metalliferous matter in preference to the particles of gangue, while the particles of gangue will be wetted by the water; * * *"**
>
> **(lines 38-40):**
>
> **"the metalliferous particles which have become *coated with oil* will *adhere together* and form granules, * * *"**
>
> **(p. 971, lines 89-94):**
>
> **"The oil used may be animal, vegetable, or mineral oil, or mixtures of these, or such coal or wood tar products or other substances which exercise, like oils, a *preferential physical affinity* for metallic mineral matter as distinguished from gangue."**

Cattermole, 777273, 1904 (R., Vol. II, pp. 973-977).

Granulation process.
Describes separation (p. 974, lines 12-15):

"by means of the selective action of oils and certain tar products or similar compounds (all hereinafter referred to as 'oil') on metallic or metalliferous matter."

(lines 20-24):

"the oil has a more or less selective action *and will coat* the particles of metalliferous matter in preference to the particles of gangue, while the particles of gangue will be wetted by the water."

(lines 34-36):

"the metalliferous particles which have become *coated with oil* will *adhere together* and form granules."

(p. 975, lines 89-94):

"The 'oil' used may be animal, vegetable, or mineral oil or mixtures of these or such coal or wood tar products or other substances which exercise, like oils, a preferential *physical* affinity for metallic mineral matter as distinguished from gangue."

The claims recite (p. 976, lines 85, 95, 105, 115, 125):

"until the *oil-coated* metalliferous matter is agglomerated into granules."

(p. 977, lines 6 and 15):

"granules of *oil-coated* particles."

Cattermole, Sulman & Picard, British, 17109 of 1903 (R., Vol. II, pp. 978-981).

A soap process.

(p. 979, lines 40-45):

"Our process has for its object the separation of minerals from the siliceous or earthy matters of ores by means of soaps or similar compounds, and is dependent

upon the *superior physical attraction* exhibited by minerals for fatty or resin acids, or for certain other aromatic derivatives (such as cresols, phenols, etc.) which form soluble salts or compounds with alkaline hydrates, as compared with earthy or siliceous substances."

(p. 980, lines 6-10):

"It is found that the liberated acids, etc., which may even be solid under ordinary conditions, are *precipitated and adhere to* the sulphuretted minerals, or to sulphur, graphite, or free metals present in the ore, leaving the gangue or earthy particles preferentially wetted by water, and free from adhesions of fatty acid and the like."

Claim 1

(p. 981, lines 7-9):

"whereby the fatty acid is *liberated and adheres* to the mineral having an affinity therefor but not to the gangue".

Claim 2

(lines 12-14):

"separating the *coated mineral matter* from the non-coated gangue and removing the fatty or resin acid from the metalliferous matter by adding alkali".

While it is true that the cresols and phenols here referred to may be used in such a way that they will wholly dissolve in the water of the pulp, they may, on the other hand, be used in such a way as not to dissolve but to remain undissolved—as by previous saturation of the water of the pulp. Manifestly they must be used in the latter way, that is, with a previously saturated pulp, in this Cattermole soap and granulation process, so that, when chemically formed from their phenylates or cresylates (soaps), they will be "precipitated and adhere to the sulphuretted minerals," and the coated minerals will adhere together to form granules. That is Cattermole's requirement, so manifestly they must be used in that way and no other.

The evidence shows that phenol and cresol were never in fact used to carry out the Cattermole granulation process in which

only was their use disclosed (in the soap form or any other form of that process), and that the necessary preliminary saturation of the pulp to cause phenol and cresol to operate in that way would be prohibitively expensive (see main Brief for Petitioner, pp. 88-90).

Cattermole, Sulman & Picard, 777274, 1904 (R., Vol. II, pp. 982, 983).

A soap process.

As in the last above British patent fatty or resin acids are named and also cresols, phenols, etc., but the statement as before is (p. 982, lines 42-60):

> "It is found that the liberated acids, &c., which may even be solid under ordinary conditions, are *precipitated and adhere to* the sulfureted minerals or to sulfur, graphite, or free metals present in the ore, leaving the gangue or earthy particles preferentially wet by water and free from adhesions of fatty acid and the like. The fatty acid and the like used for the purpose of *adhering to* the mineral particles is thus produced *in situ* throughout the suspended ore mass in the most intimate contact or admixture therewith, and the mineral particles *become attached to or more or less coated by* films of fatty or resin acid. * * * the coated metalliferous particles *adhere together* and form granules".

Claim 1 refers (p. 983, lines 9-11) to

> "the organic acid which *coats* the desired mineral particles but not the gangue".

Claim 2 refers (lines 19, 20) to

> "agitating the mixtures so as to agglomerate the *coated* mineral particles into granules".

Here, as before, the cresols and the phenols referred to are and must be so used as to carry out that which the Cattermole specification prescribes and the claims require in the way of *coating* the mineral particles (see main Brief for Petitioner, pp. 91, 92). There could be no more conclusive demonstration

of the fact that oleic acid actually coats the mineral particles than the existence of this granulation process which requires, and proceeds by, the mutual stickiness of contacting coatings; and of the fact that this reference to phenol and cresol is to such a use of them as will coat the mineral particles and coat them to the point of stickiness so that they will form granules.

Sulman and Picard, 793808, 1905 (R., Vol. II, pp. 988-992).

Described as concentration (p. 991, lines 12-15)

> "by means of oils, grease, tar, or any similar substance which has a *preferential affinity for metalliferous matter over gangue.*"

Defined as (line 19):

> "solid particles *moistened* by oil or the like."

Operation (lines 61-64):

> "The minute oil globules or the condensed vapors or volatile oils *attach themselves to* the metalliferous particles in preference to the gangue."

Metalliferous particles are referred to (line 65) as

> "The *oiled* metalliferous particles".

The inventors say (lines 16-19):

> "According to this invention we utilize the power which is possessed by films or bubbles of air or other gas of attaching themselves to solid particles moistened by oil or the like."

(lines 65-70):

> "The oiled metalliferous particles * * * have the power of attaching to themselves with a greater comparative strength than the gangue particles the films or bubbles of gas which exist in the mass * * *."

These bubbles buoyed the mineral particles up to the surface and then burst and left them there, to float by the greased needle effect (film or skin flotation) or to sink. Too much oil was used.